Research stations have fewer weeds when they have fewer weed scientists

David Jordan

Weed Management in Peanuts

Ethan Foote and David Jordan, Department of Crop and Soil Sciences, NC State University

In North Carolina and Virginia, a series of trials designed to determine the most effective herbicide combinations are in place. In Virginia, common ragweed is a major weed in peanuts. This weed, along with Palmer amaranth, is important in North Carolina. Annual grasses including Texas panicum are problematic across both states. Cocklebur, nutsedge, eclipta, and sicklepod can be persistent in peanut production systems. Other weeds can be an issue but are not as widespread.

Palmer amaranth and common ragweed are resistant to ALS-inhibiting herbicides (Group 2) in most fields in both states. Cadre, Impose, Strongarm, and Pursuit do not control these weeds completely in most fields. Palmer amaranth and common ragweed are resistant to PPO-inhibiting herbicides (Group 14) in some fields but resistance is not as widespread as resistance to ALS-inhibiting herbicides. In those fields, Cobra, Ultra Blazer, and Storm are no longer effective. PPO resistance to postemergence herbicides is more pronounced than PRE herbicides like Valor SX. In other regions of the US, Palmer amaranth resistance to group 15 herbicides has been reported (Anthem Flex, Dual Magnum, Outlook, Warrant, and Zidua.) Goosegrass resistance Group 1 herbicides (clethodim products, Poast) and Group 3 (Prowl and Sonalan) is suspected if not confirmed in other areas of the US.

The worst-case scenario would be fields with resistance to Groups 1, 2, 14, and 15 herbicides. This would leave only Gramoxone (Group 22), Basagran (Group 6), and 2,4-DB (Group 4) herbicides for weed control in peanuts. Of these, Gramoxone is the only herbicide with activity against grassy weeds. Gramoxone is effective on small annual grasses, Palmer amaranth, and common ragweed. This herbicide can only be applied in the first month of the season. Basagran and 2,4-DB are marginally effective on Palmer amaranth and common ragweed. There would be no control options for grasses for most of the season if fields had resistance to Group 1 herbicides. This was the case for peanuts prior to the early 1980s.

Gramoxone is not used in European production systems. More recently, there is concern about residues of 2,4-DB in peanuts in the EU has led to recommended cutoff dates for application of 2,4-DB earlier in the season than US EPA product labels allow. Whether this recommendation will become similar to the approach used for alachlor (Lasso) in the 1980s is not known. The long-term status of these herbicides, the primary herbicides for weed control if widespread resistance to Groups 1, 2, 14, and 15 is present, is uncertain.

The outlook for available tools (herbicides) for weed control in peanuts is not promising. BASF has developed an herbicide that may help with PPO resistance. Status at the current time is not clear. Brake (Group 12) is registered for use in peanuts. The importance of this herbicide may increase if the worst-case scenario plays out. This herbicide is not a panacea. In research in North Carolina at two locations, control of most broadleaf weeds and grasses with Brake applied with Dual Magnum, Outlook, Warrant, Prowl H2O, Valor SX, or Dual Magnum plus Valor SX was marginal. Control by Dual Magnum plus Valor SX was also marginal. However, there appeared to be an advantage to Dual Magnum plus Valor SX compared with Dual Magnum plus Brake. Both locations received rain within one day after application at amounts between 0.5 and 1 inch. Weather conditions, however, for the next few weeks was relatively dry at both locations. This is not uncommon across both states in any given year. More information on these trials will be presented on the NC State Extension Peanut Portal (https://peanut.ces.ncsu.edu/), *2024 Peanut Information* AG-331, and at peanut production meetings in winter 2024 as data are analyzed. The field plan for trials conducted at Suffolk, VA and in North Carolina at Rocky Mount and Lewiston-Woodville is attached. The trial focuses on PRE and POST combinations of herbicides with an emphasis on Dual Magnum plus Brake versus Dual Magnum plus Valor SX. We have other trials in North Carolina that include Brake plus Valor SX and Brake plus Dual Magnum plus Valor SX. Very few weeds are present at Suffolk this year (this inspired the quote at the beginning of this document.) Crop tolerance to Brake is good and in 2023 was better than crop tolerance to Valor SX.

The overview of weed management in peanuts presented above is alarming and in many ways depressing. The thought of having to control weeds in peanuts now with herbicides only available prior to the early 1980s (but without dinoseb) would not be sustainable. Hopefully, the industry will discover new herbicides with novel modes of action that can be used in peanuts. Hopefully, we will be able to decrease the pace at which weed populations evolve resistance to herbicides that are currently effective on our most common and problematic weeds. Hopefully, we can maintain herbicides that are effective against weeds while simultaneously maintaining and expanding export markets for peanuts.

In the meantime, pull up every common ragweed and Palmer amaranth plant that escapes your herbicide programs. Do not let those weeds reproduce and add resistant populations to the soil seed bank. Use overlapping residual herbicides (PPI, PRE, AC, and POST) during the season. It is more effective and less likely to move populations to resistance when weeds are controlled early and we do not have to control escaped weeds that are often too large to control when we make applications of postemergence herbicides. Control weeds as well as possible in corn, cotton, and soybean in rotations with peanuts. Glyphosate, glufosinate, and synthetic auxins are effective in these crops in most of our fields and can decrease weed seed in the soil seed bank. If you are growing vegetables or sweetpotato, do not let the gaps in production allow weeds to emerge and produce seed. Once corn is harvested, do not let weeds grow and produce seed. Develop an herbicide program with multiple MOA using either sequential or tank-mix combinations during the season. Whether using conventional tillage or some form of conservation tillage, make sure peanuts emerge in a weed-free setting. Traditional in-season weeds that are present when peanuts emerge will be challenging to control. Winter weeds such as primrose, marestail, and dogfennel cannot be controlled once peanuts emerge with any of the herbicides we currently use in peanuts. Burndown herbicides and practices the previous growing season and fall must be used to keep these populations at low levels that are manageable in the spring when peanuts are planted.

Research in North Carolina is also focused on the value of cover crops in suppressing weeds. These trials reinforce other research that shows cover crops, especially cereal rye, can suppress weeds and thrips. However, there are challenges with reduced tillage production on some soils. In 2024, we are going to readdress the value of in-season cultivation on weed control. Challenges exist with this approach, but it may be necessary in the future. As we move forward, the options in an herbicide-resistant world with peanuts is not a pretty one. Maintaining profitability will be driven in large part by contributions of escaped weeds to the soil seedbank. As I ride through both states, the vast majority of fields are free of weeds. However, many fields have a few pockets of several plants that have escaped and often remain throughout the season. These could be the plants that make it even harder to grow peanuts in the future, especially if there are fewer herbicide options.

Farmers have fewer weeds when there are more weed scientists

David Jordan

Peanut-Digging-Evaluation-Tool-V5 DLJ - Excel

To use, enter number of samples and expected peanut price in the cells below. For each sample, enter sample name, sample date, field size, potential yield, and days before optimal digging. Once data has been entered, the remaing columns in a sample row will be calculated. To clear all existing data and enter new data, click the "Clear Table" button located above and to the right side of the table.

Number of Samples	5
Peanut Price ($/lb)	0.22

Clear Table

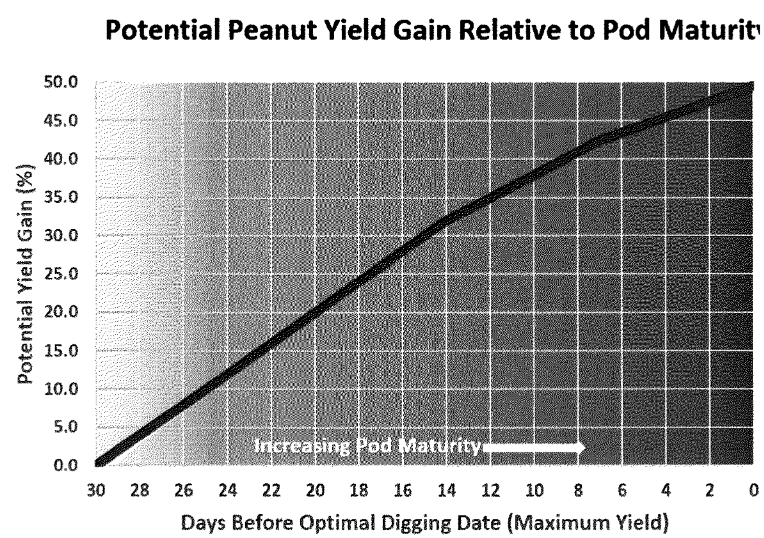
Sample Name	Sample Date	Field Size (ac)	Yield (lbs/ac)	Optimal Digging	Optimal Digging Date	Percent Potential Yield Gain	Gain (lbs/ac)	Gain ($/ac)	Gain ($)
Front 40	Sep 05	40	4200	5	Sep 10	5.0%	210	46	1,848
Back 20	Sep 05	20	4800	10	Sep 15	11.5%	552	121	2,429
East 30	Sep 05	30	4500	3	Sep 08	3.0%	135	30	891
West 60	Sep 05	60	4300	10	Sep 15	11.5%	495	109	6,527
South 45	Sep 05	45	4600	14	Sep 19	17.5%	805	177	7,970
Summary		195	4431	8.8			458	100.84	19,665

Digging Report | Yield Loss Data

1:10 PM 8/31/2023

Peanut-Digging-Evaluation-Tool-V5 DLJ - Excel

Days to Optimal Digging Date	Daily Yield Gain (%/Day)	Yield Gain (%)
30	2.0	0.0
29	2.0	2.0
28	2.0	4.0
27	2.0	6.0
26	2.0	8.0
25	2.0	10.0
24	2.0	12.0
23	2.0	14.0
22	2.0	16.0
21	2.0	18.0
20	2.0	20.0
19	2.0	22.0
18	2.0	24.0
17	2.0	26.0
16	2.0	28.0
15	2.0	30.0
14	1.5	32.0
13	1.5	33.5
12	1.5	35.0
11	1.5	36.5



Digging Report | Yield Loss Data

Background

Rotation and tillage trials were initiated at Lewiston-Woodville (1999) and Rocky Mount (2000) and have been maintained through 2022

Soil at Lewiston-Woodville is a combination of Norfolk and Goldsboro soil series

Soil at Rocky Mount is a combination of Goldsboro, Lynchburg, and Raines soil series

Trials were established primarily to compare the effects of rotation and tillage on peanut yield

Sequences of rotation had peanut in all plots around every 5 years

Impacts of rotation on corn and cotton were confounded in some cases based on rotation sequence relative to peanut

NC STATE UNIVERSITY

Summary

Rotation and tillage affected crop yield independently in most years

Rotation had a major impact on peanut yield but had only modest effects on corn and cotton yield

Peanut yield was lower in strip tillage compared with conventional tillage on fine-textured soils

Peanut yield was similar on coarse-textured soils for both tillage systems

Corn yield was greater in strip tillage compared with conventional tillage on coarse-textured soils but was similar in both tillage systems on fine-textured soils

Cotton yield was similar in strip tillage and conventional tillage on both soils

NC STATE UNIVERSITY

Crop Yield Response to Continuous Conventional and Strip Tillage

The rotation × tillage interaction was often not significant
Peanut yields reflect average of long and short rotations
Data are pooled over rotations and years

	Lewiston-Woodville (1999-2022) Norfolk and Goldsboro series	
Crop	**Conventional till**	**Strip till**
Corn (bu/acre)	119	124 * (n = 12)
Cotton (lbs lint/acre)	823	816 (n = 15)
Peanut (lbs/acre)	3917	3899 (n = 9)

	Rocky Mount (2000-2022) Lynchburg, Raines, and Goldsboro series	
Crop	**Conventional till**	**Strip till**
Corn (bu/acre)	147	150 (n = 6)
Cotton (lbs lint/acre)	904	901 (n = 11)
Peanut (lbs/acre)	3871	3147 * (n = 9)

NC STATE UNIVERSITY

Summary

Results from these and other trials were used to develop a risk index to assist growers in making a decision on transitioning from conventional tillage to reduced tillage

The majority of peanuts in North Carolina are planted in conventional tillage

The intensity of tillage in peanut production systems has decreased in conventional tillage systems

Lower peanut yield in strip tillage on fine-textured soils is attributed to greater pod loss during digging relative to conventional tillage